

Attorney Docket No. 9286.7
Application Serial No.: 10/019,902
Filed: July 2, 2002

IN THE CLAIMS

Please amend the claims as follows. The following listing of claims replaces all prior versions.

1. (currently amended) A compound of the general formula (I)

$X(B)_m$ (I)

wherein

X is an m-valent unit and

B are identical or different and denote K-R, wherein

K is a bond or is $A^1-(A^2-A^3)_k-sp$, wherein

A^1 is $(CH_2)_tY(CH_2)_u$, wherein

Y is $>C=O$, $>NH$, $-O-$, $-S-$ or a bond,

t is an integer from 0 to 6 and

u is an integer from 0 to 6,

(A^2-A^3) can be any A^2 and any A^3 in any combination,

A^2 is $-NICO-[I,]_1$ or $-CONH$, $-OCONH$ or $SCONH$, or CO ,

A^3 is $(CH_2)_r$, $O(CH_2)_r$, $NH(CH_2)_r$ or $S(CH_2)_r$, or $(CH_2)_r$, wherein

r = 1, is an integer from 1 to 6 and

Q is a substituted or unsubstituted alkyl or aryl group;

sp is a divalent spacer or a bond, and

k is an integer from 5 to 100, and

R is hydrogen or a ligand suitable for specific bonding to a receptor; and

m is at least 2,

with the proviso that

- (1) in the compound at least one R is not hydrogen.
- (2) there are at least two K that are not a bond, and
- (3) X, B and m are so selected that an intermolecular association of the K in liquid phase by the formation of hydrogen bonds is possible, with formation of aggregates that present on the surface a plurality of R that are not hydrogen, and

Attorney Docket No. 9286.7
Application Serial No.: 10/019,902
Filed: July 2, 2002

(4) the molar mass of the fragment X(K)_m is less than 20,000.

2. (previously presented) A compound according to claim 1, wherein the molar mass of the fragment X(K)_m is less than 4,000.

3. (previously presented) A compound according to claim 1, wherein
m is an integer from 2 to 4, and
X is CH_{4-m}, NH_{3-m}, N⁺H_{4-m}, >P- (when m = 3), >P⁺< (when m = 4), >B-
(when m = 3), a linear atom group C₂H_{6-m}, >CH(CH₂)₂CH<, >C=C<, >N-
N<, >N(CH₂)_zN< wherein z = 2 - 6, when m = 4), a carbocyclic atom
group C₆H_{6-m}, C₆H_{12-m}, or a heterocyclic atom group C₃N₃ (when m = 3),
C₄N₂ (when m = 4).

4. (previously presented) A compound according to claim 1, wherein there are at least 3 K.

5. (previously presented) A compound according to claim 1, wherein at least two R are not hydrogen.

6. (previously presented) A compound according to claim 1, wherein at least three R are not hydrogen.

7. (canceled)

8. (previously presented) A compound according to claim 1, wherein the ligand R is sialic acid, sialyl lactose, sialyl lactosamine, lactose, mannose, Gal α 1-3Gal, Gal α 1-3(Fuc α 1-2)Gal, GalNAc α 1-3(Fuc α 1-2)Gal, Neu5Ac α 2-6GalNAc, SiaLe \wedge , SiaLe \wedge , HSO₃Le \wedge , HSO₃Le \wedge , Gal α 1-3Gal β 1-4GlcNAc, Gal α 1-3Gal β 1-4Glc, HSO₃GlcA β 1-3Gal β 1-4GlcNAc, N-acetyl-lactosamine or polylactosamine, or wherein the ligand R is sialic acid benzyl glycoside,

Attorney Docket No. 9286.7
Application Serial No.: 10/019,902
Filed: July 2, 2002

HSO₃GlcA β 1-3Gal, HSO₃GlcA β 1-3Gal β 1-4GlcNAc β 1-3Gal β 1-4Glc, GalNAca, GalNAca1-3(Fuca1-2)Gal β 1-4GlcNAc, Gal α 1-3(Fuca1-2)Gal β 1-4GlcNAc, HSO₃(Sia)Le^X, HSO₃(Sia)Le^A, Le^Y, GlcNAc β 1-6(GlcNAc β 1-3)Gal β 1-4Glc, GalNAc β 1-4(Neu5Aca2-3)Gal β 1-4Glc, mannose-6-phosphate, GalNAc β 1-4GlcNAc, oligo-sialic acid, N-glycolylneuraminic acid, Gal α 1-4Gal β 1-4Glc, or Gal α 1-4Gal β 1-4GlcNAc.

9. (previously presented) A compound according to claim 1, wherein
m is an integer from 2 to 4,
X is CH_{4-m},
A¹ is CH₂,
A² is NHCO,
A³ is CH₂,
k is 8,
sp is (CH₂)₃CONHCH₂CONHC₆H₄-4-CH₂O- and
R is Neu5Aca2-6Gal β 1-4GlcNAc.

10. (currently amended) An aggregate of the general formula (II):

{X(B)_m}_n (II)

wherein X(B)_m may be identical or different and denote a compound of the general formula (I),

X(B)_m (I)

wherein

X is an m-valent unit and
B are identical or different and denote K-R, wherein
K is a bond or is A¹-(A²-A³)_k-sp, wherein
A¹ is (CH₂)_tY(CH₂)_u, wherein
Y is >C=O, >NH, -O-, -S- or a bond.
t is an integer from 0 to 6 and
u is an integer from 0 to 6,
(A²-A³) can be any A² and any A³ in any combination,

Attorney Docket No. 9286.7
Application Serial No.: 10/019,902
Filed: July 2, 2002

A^2 is $-\text{NHCO}-[\text{,}]$ or $-\text{CONH}-$, $-\text{OCONH}-$ or $-\text{SCONH}-$, or $-\text{CO}-$,

A^3 is $(\text{CH}_2)_r$, $\text{O}(\text{CH}_2)_r$, $\text{NH}(\text{CH}_2)_r$, or $\text{S}(\text{CH}_2)_r$, or $-(\text{CH}_2)_r$, wherein
 r = 1 is an integer from 1 to 6 and

Q is a substituted or unsubstituted alkyl or aryl group,

sp is a divalent spacer or a bond, and

k is an integer from 5 to 100, and

R is hydrogen or a ligand suitable for specific bonding to a receptor; and

m is at least 2,

with the proviso that

- (1) in the compound at least one R is not hydrogen,
- (2) there are at least two K that are not a bond, and
- (3) X , B and m are so selected that an intermolecular association of the K in liquid phase by the formation of hydrogen bonds is possible, with formation of aggregates that present on the surface a plurality of R that are not hydrogen, and
- (4) the molar mass of the fragment $X(K)_m$ is less than 20,000, and
 n is from 2 to 100,000,

and wherein $X(B)_m$ are non-covalently bonded.

11. (previously presented) An aggregate according to claim 10 having a leaf-like, linear, cyclic, polycyclic, polyhedral, spherical or dendritic structure.

12. (currently amended) An aggregate according to claim 10 of two or more different compounds comprising a compound of the general formula (I)

$X(B)_m$ (I)

wherein

X is an m -valent unit and

B are identical or different and denote $K-R$, wherein

K is a bond or is $A^1-(A^2-A^3)_k-sp$, wherein

A^1 is $(\text{CH}_2)_lY(\text{CH}_2)_u$, wherein

Y is $>\text{C=O}$, $>\text{NH}$, $-\text{O}-$, $-\text{S}-$ or a bond,

Attorney Docket No. 9286.7
Application Serial No.: 10/019,902
Filed: July 2, 2002

t is an integer from 0 to 6 and
u is an integer from 0 to 6,
(A²-A³) can be any A² and any A³ in any combination,
A² is -NHCO-[,]- or -CONH-, -OCONH- or -SCONH-, or -CO-,
A³ is (CH₂)_r, O(CH₂)_r, NH(CH₂)_r, or S(CH₂)_r, wherein
r = 1 is an integer from 1 to 6 and
Q is a substituted or unsubstituted alkyl or aryl group;
sp is a divalent spacer or a bond, and
k is an integer from 5 to 100, and
R is hydrogen or a ligand suitable for specific bonding to a receptor; and

m is at least 2,

with the proviso that

- (1) in the compound at least one R is not hydrogen,
- (2) there are at least two K that are not a bond, and
- (3) X, B and m are so selected that an intermolecular association of the K in liquid phase by the formation of hydrogen bonds is possible, with formation of aggregates that present on the surface a plurality of R that are not hydrogen, and
- (4) the molar mass of the fragment X(K)_m is less than 20,000.

13. (canceled)

14. (previously presented) A method according to claim 27, further comprising adding a concentrated salt solution, changing the pH or the temperature, or adding organic solvents.

15. (currently amended) A method for changing the structure of an aggregate of the general formula (II)

$\{X(B)_m\}_n$ (II)

wherein X(B)_m may be identical or different and denote a compound of the general formula (I),

X(B)_m (I)

Attorney Docket No. 9286.7
Application Serial No.: 10/019,902
Filed: July 2, 2002

wherein

X is an m-valent unit and

B are identical or different and denote K-R, wherein

K is a bond or is $A^1-(A^2-A^3)_k-sp$, wherein

A^1 is $(CH_2)_tY(CH_2)_u$, wherein

Y is $>C=O$, $>NH$, $-O-$, $-S-$ or a bond,

t is an integer from 0 to 6 and

u is an integer from 0 to 6,

(A^2-A^3) can be any A^2 and any A^3 in any combination,

A^2 is $-NHCO-[I,J]$ or $-CONH-$, $-OCONH-$ or $SCONH-$, or $CO-$,

A^3 is $(CH_2)_r$, $O(CH_2)_r$, $NH(CH_2)_r$, or $S(CH_2)_r$, or $(CH_2)_r$, wherein

r = 1, is an integer from 1 to 6 and

~~Q is a substituted or unsubstituted alkyl or aryl group;~~

sp is a divalent spacer or a bond, and

k is an integer from 5 to 100, and

R is hydrogen or a ligand suitable for specific bonding to a receptor; and

m is at least 2,

with the proviso that

- (1) in the compound at least one R is not hydrogen,
- (2) there are at least two K that are not a bond, and
- (3) X, B and m are so selected that an intermolecular association of the K in liquid phase by the formation of hydrogen bonds is possible, with formation of aggregates that present on the surface a plurality of R that are not hydrogen, and

(4) the molar mass of the fragment $X(K)_m$ is less than 20,000, and

n is from 2 to 100,000,

and wherein $X(B)_n$ are non-covalently bonded,

further comprising adding a concentrated salt solution, changing the temperature or the pH and/or adding urea, trifluoroethanol or peptides.

Attorney Docket No. 9286.7
Application Serial No.: 10/019,902
Filed: July 2, 2002

16. (previously presented) A method according to claim 27 further comprising increasing the specific physiological activities of molecules by incorporating a radical R into a compound of the general formula (I).

17. (canceled)

18. (currently amended) A method of treating diseases arising from inflammation, viral and bacterial infections, influenza viruses, selectin-mediated inflammatory processes, tumour metastases, or in the neutralisation of antibodies in autoimmune disorders and transplants; said method comprising administering a compound of the general formula (I)

$X(B)_m$ (I)

wherein

X is an m-valent unit and

B are identical or different and denote K-R, wherein

K is a bond or is $A^1-(A^2-A^3)_k-sp$, wherein

A^1 is $(CH_2)_tY(CH_2)_u$, wherein

Y is $>C=O$, $>NH$, $-O-$, $-S-$ or a bond,

t is an integer from 0 to 6 and

u is an integer from 0 to 6,

(A^2-A^3) can be any A^2 and any A^3 in any combination,

A^2 is $-NHCO-[,]-$ or $-CONH-$, $-OCONH-$ or $SCONH-$, or $CO-$,

A^3 is $(CH_2)_r$, $O(C_2H_5)_r$, $NH(CH_2)_r$, or $S(CH_2)_r$, or $(CHQ)_r$, wherein

r = 1 is an integer from 1 to 6 and

Q is a substituted or unsubstituted alkyl or aryl group.

sp is a divalent spacer or a bond, and

k is an integer from 5 to 100, and

R is hydrogen or a ligand suitable for specific bonding to a receptor; and

m is at least 2,

with the proviso that

(1) in the compound at least one R is not hydrogen,

Attorney Docket No. 9286.7
Application Serial No.: 10/019,902
Filed: July 2, 2002

- (2) there are at least two K that are not a bond, and
- (3) X, B and m are so selected that an intermolecular association of the K in liquid phase by the formation of hydrogen bonds is possible, with formation of aggregates that present on the surface a plurality of R that are not hydrogen, and
- (4) the molar mass of the fragment X(K)_m is less than 20,000; or
administering into an aggregate of the general formula (II)



wherein

X(B)_m may be identical or different and denote a compound of the general formula (I), and
n is from 2 to 100,000,

and wherein X(B)_m are non-covalently bonded.

19. (canceled)

20. (previously presented) A method according to claim 18 further comprising preparing functionalized molecular surfaces.

21. (canceled)

22. (canceled)

23. (currently amended) A compound of the general formula (I),



wherein

X is an m-valent unit and

B are identical or different and denote K-R, wherein

K is a bond or is A¹-(A²-A³)_k-sp, wherein

A¹ is (CH₂)_tY(CH₂)_u, wherein

Y is >C=O, >NH, -O-, S- or a bond,

t is an integer from 0 to 6 and

Attorney Docket No. 9286.7
Application Serial No.: 10/019,902
Filed: July 2, 2002

u is an integer from 0 to 6,
(Λ^2 - Λ^3) can be any Λ^2 and any Λ^3 in any combination,
 Λ^2 is $-\text{NHCO}-[\text{I},\text{I}]$ or $-\text{CONH}-$, $-\text{OCONH}-$ or $-\text{SCONH}-$, or $-\text{CO}-$,
 Λ^3 is $(\text{CH}_2)_r$, $\text{O}(\text{CH}_2)_r$, $-\text{NH}(\text{CH}_2)_r$, or $\text{S}(\text{CH}_2)_r$, or $-(\text{CH}_2)_r$, wherein
r = 1 is an integer from 1 to 6 and
Q is a substituted or unsubstituted alkyl or aryl group,
sp is a divalent spacer or a bond, and
k is an integer from 5 to 100, and

R is hydrogen or a ligand suitable for specific bonding to a receptor; and
m is at least 2,

with the proviso that

- (1) X, B and m are so selected that an intermolecular association of the K in liquid phase is possible, especially under aqueous conditions, by the formation of hydrogen bonds, with formation of aggregates, and
- (2) the molar mass of the fragment X(K)_m is less than 20,000, especially less than 4000.

24-26. (canceled)

27. (currently amended) A method of preparing an aggregate comprising:
preparing a compound of the general formula (II)

{X(B)_m}_n (II)

wherein

X(B)_m may be identical or different and denote a compound of the general formula (I),

X(B)_m (I)

wherein

X is an m-valent unit and

B are identical or different and denote K-R, wherein

K is a bond or is $\Lambda^1-(\Lambda^2-\Lambda^3)_k-sp$, wherein

Λ^1 is $(\text{CH}_2)_rY(\text{CH}_2)_s$, wherein

Y is $>\text{C}=\text{O}$, $>\text{NH}$, $-\text{O}-$, $-\text{S}-$ or a bond,

Attorney Docket No. 9286.7
Application Serial No.: 10/019,902
Filed: July 2, 2002

t is an integer from 0 to 6 and
u is an integer from 0 to 6,
(A²-A³) can be any A² and any A³ in any combination,
A² is -NHCO-[,] or -CONH-, -OCONH- or -SCONH-, or -CO-,
A³ is (CH₂)_r, O(CH₂)_r, NH(CH₂)_r, or S(CH₂)_r, or -(CHO)-, wherein
r = 1, is an integer from 1 to 6 and
Q is a substituted or unsubstituted alkyl or aryl group,
sp is a divalent spacer or a bond, and
k is an integer from 5 to 100, and
R is hydrogen or a ligand suitable for specific bonding to a receptor; and
m is at least 2,
with the proviso that
(1) in the compound at least one R is not hydrogen,
(2) there are at least two K that are not a bond, and
(3) X, B and m are so selected that an intermolecular association of the K in liquid phase by
the formation of hydrogen bonds is possible, with formation of aggregates that present on
the surface a plurality of R that are not hydrogen, and
(4) the molar mass of the fragment X(K)_m is less than 20,000, and
n is from 2 to 100,000,
and wherein X(B)_m are non-covalently bonded.

28. (currently amended) A method of preparing a therapeutic drug comprising:
preparing the compound of the general formula (I)

X(B)_m (I)

wherein

X is an m-valent unit and
B are identical or different and denote K-R, wherein
K is a bond or is A¹-(A²-A³)_k-sp, wherein
A¹ is (CH₂)_lY(CH₂)_u, wherein
Y is >C=O, >NH, -O-, -S- or a bond,

Attorney Docket No. 9286.7
Application Serial No.: 10/019,902
Filed: July 2, 2002

t is an integer from 0 to 6 and
u is an integer from 0 to 6,
(A²-A³) can be any A² and any A³ in any combination,
A² is -NHCO-{[I,II]} or -CONH-, -OCONH- or -SCONH-, or -CO-,
A³ is (CH₂)_r, O(CH₂)_r, NH(CH₂)_r, or S(CH₂)_r, or -(CH₂Q)-, wherein
r = 1, is an integer from 1 to 6 and
Q is a substituted or unsubstituted alkyl or aryl group,
sp is a divalent spacer or a bond, and
k is an integer from 5 to 100, and

R is hydrogen or a ligand suitable for specific bonding to a receptor; and

m is at least 2,

with the proviso that

- (1) in the compound at least one R is not hydrogen,
- (2) there are at least two K that are not a bond, and
- (3) X, B and m are so selected that an intermolecular association of the K in liquid phase by the formation of hydrogen bonds is possible, with formation of aggregates that present on the surface a plurality of R that are not hydrogen, and
- (4) the molar mass of the fragment X(K)_m is less than 20,000; or

preparing the compound of the general formula (II):

{X(B)_m}_n (II)

wherein

X(B)_m may be identical or different and denote a compound of the general formula (I), and

n is from 2 to 100,000,

and wherein X(B)_m are non-covalently bonded; and

a pharmaceutically acceptable carrier.

29. (canceled)